Remarks/Arguments

Claims 1 and 17 are amended. Claims 23-25 are new. Claims 1-12, 17 and 19-25 are pending in the application. Support for the amendments and new claims can be found at figures 1 and 7 and pages 7 and 24 of the specification. No new matter has been added. Reexamination and reconsideration of the application, as amended, are respectfully requested.

Claim Rejections Under 35 USC § 103

Claims 1-12, 17, 19-20, and 22 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Takeshi, et al. (JP 02-201904) in view of Fujimori (JP 10-189322 A). Applicant respectfully traverses this rejection.

Claims 1 and 17, have been amended to indicate that the ferromagnetic particles are <u>granular</u>. Applicant respectfully submits that Takeshi fails to disclose or teach at least, the following as set forth by the claims: (A) granular ferromagnetic metal particles; (B) granular ferromagnetic metal particles having a mean particle size of 5 to 15 nm; and (C) a nonmagnetic insulating organic material in the granular substance that is in the range of 5 to 50 vol%.

In contrast, Takeshi discloses that:

> "Simultaneous vacuum deposition makes it easy for the ferromagnetic metal to <u>realize a column structure</u> and <u>a polymer deposits between the columns</u>. Since an insulating polymer deposits between the columns, an electric resistance increases in comparison with a simple substance of an original ferromagnetic metal. Thereby, an eddy current loss reduces, deterioration of permeability in a high frequency region is restrained, and a saturated flux density increases" (page 2, upper left column).

A such, the structure disclosed by **Takeshi** does not correspond to a granular substance.

Although Table 1 of **Takeshi** shows coercive force of high permeability materials, it is very difficult to calculate the mean particle size of the ferromagnetic metal particles in **Takeshi** based on only coercive force. This is because a mean particle size of ferromagnetic metal particles depends on several factors such as an exchange stiffness constant and magneto-crystalline anisotropy, which are determined based on a type of production methods and kind of materials.

In Examples 1 and 2 of **Takeshi,** high permeability materials with a thickness of 5 μm were prepared by vacuum depositing Fe (ferromagnetic metal particles) and polymer. In order to realize the structure wherein the ferromagnetic metal particles have a column structure and the polymer deposits between the columns, **the ferromagnetic metal particles must have a mean particle size of 1 μm or more** in view of the energy balance of a general deposition process.

Assuming that the high permeability materials of **Takeshi** have a mean particle size of 5 to 15 nm like the present invention while the ferromagnetic metal particles have a column structure and the polymer deposits between the columns, the cross sectional structure of the ferromagnetic metal particles shall be extremely spindly.

Thus, even in a case when the high permeability material has a thickness of 1 μm (Takeshi's Examples have a thickness of 5 μm), the aspect ratio (major axis/minor axis) of the ferromagnetic metal particles shall be 100.

It seems impossible to realize a column structure having an aspect ratio of 100 in view of the energy balance of a general deposition process. Although no mean particle size of the ferromagnetic metal particles is mentioned in **Takeshi**, the ferromagnetic metal particles will probably have an aspect ratio of 1 if the

deposition is conducted in a uniform energy field, leading to have a mean particle size of 1 μm or more.

Fujimori is not seen to remedy the defects of Takeshi and the Office does not rely upon the reference for such. Instead, **Fujimori** is cited for its relevance regarding ferromagnetic metal phases having a mean particle size of 20 nm or less, or 10 nm or less.

The magnetic thin film of **Fujimori**, consists of ferromagnetic metal phases and <u>ferromagnetic</u> insulating phases, whereas the granular substance of the present claims 1 and 17 essentially consists of ferromagnetic metal particles and a <u>nonmagnetic</u> insulating organic material. In other words, the <u>ferromagnetic</u> insulating phases of Fujimori does not correspond to the <u>nonmagnetic</u> insulating organic material of the present claims 1 and 17.

Claims 1 and 17, as amended, states that the volume ratio of the nonmagnetic insulating organic material in the granular substance is in the range of 5 to 50%. In connection with this feature, the specification recites the following:

> "For obtaining the soft magnetic properties, it is important that the ferromagnetic metal particles 2 has a mean particle size of 50 nm or less, the spins of the ferromagnetic metal particles 2 are in random orientations, and the distance between the ferromagnetic metal particles 2 is a distance enabling exchange coupling therebetween." (page 10, second paragraph)
>
> "For obtaining the soft magnetic properties, it is important that the distance between the ferromagnetic metal particles 2 is a distance enabling exchange coupling therebetween as described above. In the present invention, the distance between the ferromagnetic metal particles 2 can be adjusted by the volume ratio of the matrix 3. If the volume ratio of the matrix 3 exceeds 50%, the distance between the ferromagnetic metal particles 2

> becomes so large that exchange coupling force between the ferromagnetic metal particles 2 is lost. Thus, in the present invention, the volume ratio of the matrix 3 formed of the nonmagnetic insulating organic material is 50% or less." (page 10, last paragraph)

In order to obtain a nano-sized ferromagnetic metal, the magnetization in each of the ferromagnetic metal particles needs to be in random orientations. The orientations are affected by a particle size, magnetic anisotropy energy, grain boundary structure and so on.

The following figure schematically represents the random anisotropy model for very small and simple ferromagnetic metal particles. In contrast, the present granular substance comprises a nonmagnetic insulating organic material such as an organic polymer which exists between the ferromagnetic metal particles. The granular substance of the present invention is designed in order for the nonmagnetic insulating organic material to have a suitable thickness between the ferromagnetic metal particles, and lead to obtain a high resistivity while the exchange coupling between the ferromagnetic metal particles is enabled. In contrast, **Fujimori** fails to disclose and suggest how to set the volume ratio of the nonmagnetic insulating organic material.

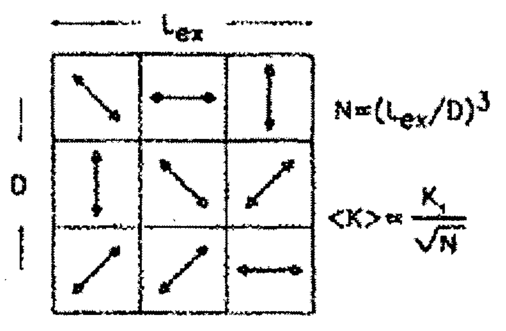
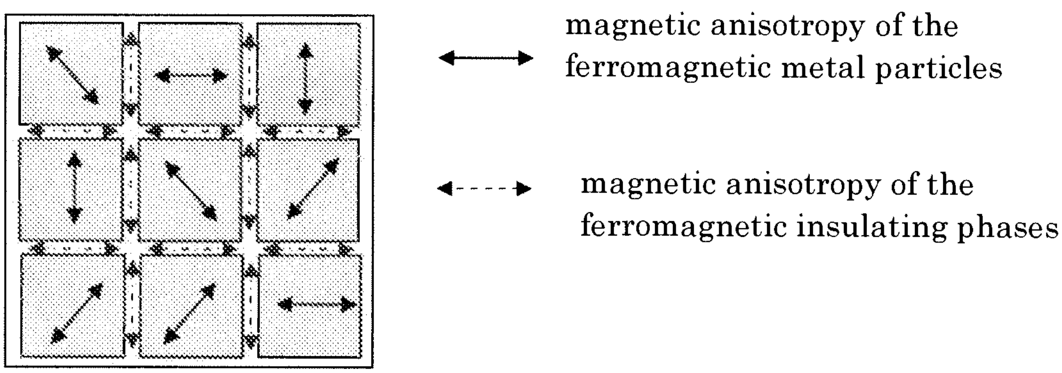


Fig. 5 Schematic representation of the random anisotropy model. The arrows indicate the randomly fluctuating magneto-crystalline anisotropies.

[Ref] G. Herzer, "Grain Size Dependence of Coercivity and Permeability in Nanocrystalline Ferromagnets", IEEE Trans. Mag., 26(5), 1397-1402 (1990).

Since the magnetic thin film of **Fujimori** is consistsof ferromagnetic metal phases and <u>ferromagnetic</u> insulating phases, other magnetic moment interferes with the exchange coupling between the ferromagnetic metal particles. Thus, the mechanism of magnetism in **Fujimori** is different from that in the present granular substance in which the exchange coupling between the ferromagnetic metal particles is enabled.

The magnetic thin film of **Fujimori** may have the following magnetic anisotropy configuration, and thus the magnetic interaction in **Fujimori** must be very complicated. It is not clear if the magnetic anisotropy of the ferromagnetic metal particles of **Fujimori** can be in random orientations without being affected by the magnetic anisotropy of the ferromagnetic insulating phases.



As such, the combined teachings of the prior art fail to teach or suggest each element of the claimed invention. As such, the combination suggested by the Office cannot render the claimed invention obvious.

Accordingly, **Takeshi** in view of **Fujimori** is not obvious over present claims 1 and 17. Likewise, dependent claims 2-12, 19-20, 22, and 23-25 are also patentable over **Takeshi** in view of **Fujimori** for at least the same reasons as claims 1 and 17.

In view of the foregoing, Applicant respectfully requests that the Office withdraw the rejection.

Claim 21 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Takeshi, et al. in view of Fujimori, and further in view of Gay, et al. (U.S. Pat. No. 5,629,092). Applicant respectfully traverses this rejection.

Claim 21 depends from amended claim 17, and as such includes all the limitations thereof, and is therefore patentable over **Takeshi** in view of **Fujimori** for at least the same reasons discussed above with regard to claim 17. **Gay** is not seen to remedy the defects of **Takeshi** and **Fujimori** and the Office does not rely upon the references for such. Instead, **Gay** is cited for its relevance regarding soft ferromagnetic particles coated with Teflon in obtaining high lubricity (Col. 5, lines 1-45 & 62-67).

In light of the foregoing, Applicant respectfully submits that, **Takeshi**, **Fujimori,** and **Gay** could not have anticipated or rendered obvious claim 21, because the cited references fail to teach or suggest each and every claim limitation. Withdrawal of this rejections is respectfully requested.

In view of the foregoing, it is respectfully submitted that the application is in condition for allowance. Reexamination and reconsideration of the application, as amended, are requested.

If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call the undersigned attorney at the Los Angeles, California telephone number (310) 785-4600 to discuss the steps necessary for placing the application in condition for allowance.

If there are any fees due in connection with the filing of this response, please charge the fees to our Deposit Account No. 50-1314.

Respectfully submitted,

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Date: March 11, 2010

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